STATEMENT OF
BASIS
95th TERRACE SITE
U.S. DEPARTMENT OF ENERGY KANSAS CITY PLANT
KANSAS CITY, MISSOURI

INTRODUCTION

This document describes the proposed final remedy for contaminated groundwater and soil at the 95th Terrace Site at the U.S. Department of Energy (DOE), Kansas City Plant and explains the reasons for recommending this remedy. In addition, it presents summaries of other corrective measure alternatives considered and evaluated for the 95th Terrace Site. The Missouri Department of Natural Resources (DNR) is issuing this document as part of its public participation responsibilities under the Missouri Hazardous Waste Management Law and regulations including those portions of the federal Resource Conservation and Recovery Act (RCRA) which are incorporated by reference therein.

The information summarized in this document is detailed in several other documents contained within the administrative record. These documents and the locations of the administrative record are listed in the "Public Participation" section of this document. The DNR encourages the public to review documents in the administrative record for a better understanding of the corrective action activities conducted at the 95th Terrace Site.

DNR will approve a final remedy for the 95th Terrace Site only after the public comment period has ended and all comments have been reviewed and DNR has responded to those comments. Public comment on the proposed final remedy and other corrective measures alternatives, including options not previously evaluated, is important to the final remedy approval decision-making process. DNR may modify the proposed final remedy or select other remedies based on new information or comments received from the public during the comment period. A public hearing regarding the proposed final remedy will be scheduled if sufficient public interest is shown and a request for a public hearing is received stating the issues that will be raised during the hearing.

This Statement of Basis (SB) document will first introduce the 95th Terrace Site in relation to the Bannister Federal Complex in Kansas City, Missouri, and describe its environmental history. A general description of the proposed final remedy is then provided along with risks that the site may pose. The proposed final remedy is then described in greater detail along with a summary of other corrective measures alternatives evaluated in the Corrective Measures Study (CMS). The proposed final remedy is then compared and contrasted with the other evaluated alternatives. Finally, public participation information including the location where documents can be reviewed and names of regulatory contacts are provided.

95TH TERRACE BACKGROUND

The DOE Kansas City Plant (KCP) is part of the Bannister Federal Complex, located east of Troost Avenue between 95th Street and Santa Fe Trail at 2000 East Bannister Road in Kansas City, Missouri, (see Figure 1 attached). The KCP occupies nearly 130 acres of the 300-acre federal complex. Two streams border the facility: Indian Creek to the south and the Blue River to the east.

Other tenants at the federal complex are the Internal Revenue Service, the General Services Administration, the Federal Aviation Administration, and the U.S. Marine Corps.

The KCP site was used primarily for farming and grazing until the 1940s, although for a brief period during the 1920s, it was used as an automobile race track. In 1942, the U.S. Navy built an aircraft engine production plant on the site. Pratt-Whitney operated the engine plant from 1943 until World War II ended in 1945.

After the war, the plant was used for storage. The Westinghouse Corporation leased part of the facility in 1947. The Atomic Energy Commission, the predecessor of DOE, selected the site to build non-nuclear components for nuclear weapons. In 1949, the Bendix Corporation, now Honeywell Federal Manufacturing & Technologies Limited Liability Company, began operating the facility under a contract with the Atomic Energy Commission. General Services Administration warehouse operations began in the western portion of the main manufacturing building (MMB) in the early 1960s. Today, the principal mission of the KCP remains the manufacture and procurement of non-nuclear components for nuclear weapons.

The site is named after the street (95th Terrace) located in front (south) of the KCP that overlies a portion of the area (Figure 2 attached). It is bordered to the south by Indian Creek and on the east and north by parking lots. Part of the 95th Terrace Site is located on property owned by the state of Missouri. The actual area of contamination within the 95th Terrace Site corresponds to a former channel of Indian Creek that existed up until 1969 when Indian Creek was rerouted during the construction of Bannister Road and a corresponding flood control levee. During the course of historical corrective action activities at the facility pursuant to an 1989 U.S. Environmental Protection Agency (EPA)-issued 3008(h) Corrective Action Order on Consent (Order), the KCP was split into parcels to better manage investigation and remediation. This approach to corrective action continued as formal oversight for corrective action transitioned from EPA-lead to State-lead in October 6, 1999, as a function of the state's issuance of the MHWMF Part I Permit and EPA's subsequent termination of the Order. Other parcels including the Northeast Area, Miscellaneous Contaminated Soils, and Multiple Sites have already had final remedies implemented. The 95th Terrace Site is the last parcel at the facility lacking a final remedy.

Surface drainage from the southeast portion of the KCP drains into stormwater Outfall 002 that empties into Indian Creek. Stormwater discharges from the KCP have been regulated since the mid-1970's under a permit first issued by EPA and since 1982 by the DNR. During construction of Bannister Road and the flood control levee (1970-1971), Indian Creek was rerouted and the stormwater outfall was moved over 500 feet south to its present location (Figure 3 attached). The immediate area where stormwater entered the former old Indian Creek channel (Figure 3) was previously remediated to address polychlorinated biphenyl (PCB) contamination at this

location in 1993 as part of a project called Abandoned Indian Creek Outfall (AICO) (DOE 1993)). The old channel between the two outfall locations (old and new), excluding the remediated former outfall site AICO, constitutes a significant portion of the 95th Terrace Site**.** Other areas include soil underlying 95th Terrace and Bannister Road and soil along and adjacent to regulated stormwater Outfall 002.

Primary contaminants of concern at both the AICO site and the 95th Terrace Site are PCBs. PCBs were used as a component in heat transfer fluid in plastic product manufacturing operations located in the southeast corner of the MMB. PCBs are no longer used at the facility. The spills occurred in 1969 and 1971. The 1969 spill occurred when an expansion joint failed and released approximately 1500 gallons of PCB oil to an adjacent gravel area. Approximately 900 of the 1500 gallons of PCB containing oil went into the storm sewer and discharged via the 002 storm sewer system to Indian Creek. The spill was reportedly cleaned up by accepted practices at the time using hay and pitch forks. Despite this effort, residual PCBs remained in the creek bottom sediments. Shortly thereafter, Indian Creek was rerouted to the current configuration. The 1969 contamination was entombed in place beneath 40 feet of fill material added during construction of Bannister Road (95th Street). The 1969 spill was the primary source for 95th Terrace PCB soil contamination. In 1971 after the Indian Creek channel had been rerouted, another PCB spill occurred from the same operating department. Approximately 1100 gallons of PCB-containing oil discharged to surface soils outside the department. Some of the PCB oils reached the storm sewer and discharged to Indian Creek at its current location via the newly installed box culvert and 002 Outfall raceway. This release contaminated soils in the vicinity of the new 002 Outfall. In 1988 these soils were removed down to a depth of 4 feet and then covered with 4 feet of clean soil with EPA oversight. The EPA-established cleanup level for this remediation project allowed PCBs to remain at approximately 1 mg/kg to 4 mg/kg. This area is not on KCP property but on property currently owned by the Missouri Department of Transportation (MoDOT). Soil contamination associated with sediments within the rerouted channel of Indian Creek at the 95th Terrace Site remains buried under Bannister Road.

Sampling done for the RCRA Facility Investigation (RFI) for the 95th Terrace identified PCB sediment contamination at concentrations up to 2.3 mg/kg near the location where Outfall 002 empties into Indian Creek. No contamination was detected in sediment samples taken for the RFI at other points along Indian Creek; however, subsequent sampling done in December 2002 detected 0.09 mg/kg upstream of the facility's outfalls. This indicates low level sediment contamination from other unrelated upstream sources may be present in Indian Creek.

Surface water samples collected from Indian Creek during the RFI, did not contain PCBs above the analytical detection limits. However, subsequent sampling utilizing EPA Method 1668 with a lower detection limit did identify low levels of PCBs in water from Indian Creek. Surface water samples collected in December 2002 utilizing EPA Method 1668 contained PCBs ranging from 0.001 µg/L to 0.003 µg/L. PCBs were detected both upstream and downstream of Outfall 002 suggesting that PCBs present within the creek may be from upstream non-facility-related sources.

Groundwater samples were collected during the investigation of 95th Terrace with several samples found to contain PCBs above the EPA drinking water standard of 0.5 µg/L. Detailed studies were performed during the RFI that concluded PCBs in groundwater were not mobile at

concentrations above the PCB drinking water standard. This was because the PCBs were found to be related to contaminated soil that became suspended in groundwater samples obtained from wells placed in the old Indian Creek channel. PCBs attached to soil and sediment are not typically mobile in the environment, unless the sediment is moving. Contaminated soil particles are not mobilized by flowing groundwater in this situation because the soil materials themselves are generally too fine grained to allow subsurface soil particle movement. Hence, PCBs cannot be carried by soil particles suspended in groundwater and cannot be moved away from their current location by groundwater movement. When the groundwater samples are filtered to remove any suspended sediment, no PCBs are present in the groundwater above analytical detection limits.

The summary of the RFI Report for the 95th Terrace concluded:

1) PCBs are essentially immobile in groundwater, as they attach to sediment/soil particles.
2) About 7,897 kg of PCBs are present in soil beneath the 95th Terrace Street and Bannister Road.
3) The fish in Indian Creek contain PCBs below the Food and Drug Administration health-based guideline of 2 ug/g for permissible consumption of fish tissue.
4) Low level (2.3 mg/kg or less) Indian Creek PCB sediment concentration is localized near the 002 Outfall.
5) Outfall 002 discharge PCB concentrations have historically been below the National Pollutant Discharge Elimination System (Missouri State Operating Permit (SOP)) limit of 1 ug/L although the effluent PCB limit was lowered to 0.5 ug/L effective on November 6, 2002.

   NOTE: Stormwater discharges leaving the DOE KCP are regulated by the SOP. Due to difficulty in meeting the 0.5 ug/L limit all the time, the DOE KCP is negotiating a Consent Judgment with the DNR Water Protection Program. Outfall 002 historically had a base flow over 100 gallons per minute (GPM), with single pass cooling water making up most of the discharge. The cooling water came from the public water supply, and contained levels of total residual chlorine that exceeded the SOP discharge limit for total residual chlorine. The KCP removed this water from Outfall 002 in November 2003 leaving a base flow of about 5-10 GPM. With reduced base flow, the concentration of PCBs increased. The CMS for the 95th Terrace Site indicates that 0.06573 pounds of PCBs were discharged to Indian Creek from Outfall 002 in calendar year 2002, while 0.01398 pounds were discharged in calendar year 2004. Although the average PCB concentration increased from 2002 to 2004, the reduction in base flow has a larger impact on the reduction of overall mass being discharged from Outfall 002 to Indian Creek. A base flow reroute system was put into operation March 7, 2005, to divert the base flow to the on-site Groundwater Treatment System. First flush run-off events that produce flow at Outfall 002 sometimes still exceed the 0.5 ug/L limit for PCBs in the SOP. Additional actions taken to reduce the PCBs from entering Outfall 002 include rerouting roof drains, sediment removal from pipes and drains, removing PCB contaminated sediment from the roof, and encapsulate or remove tar containing PCBs from air handling system

support structures. The SOP and current regulations allow for a site specific evaluation of the conditions in Indian Creek and will establish an alternate limit for PCBs. Risk assessment work to date indicates there is little health risk by direct contact with the water at Outfall 002 due to access limitation (steel grate prevents contact with discharge prior to entering Indian Creek), and the fish do not contain unsafe levels of PCBs.

PROPOSED FINAL REMEDY

The primary contaminants of concern at the 95th Terrace Site are PCBs in soil, sediment, and surface water.

The primary goal of the proposed final remedy is to protect human health and the environment by performing the following:

- Minimizing exposure of potential receptors to soil contamination in excess of the risk-based cleanup goals for soil.
- Minimizing infiltration of PCB-contaminated soil into the 002 storm sewer system.
- Minimizing exposure to sediment containing PCBs in Indian Creek near the 002 Outfall. This objective is protective of recreational users and future construction workers who would work in Indian Creek near the 002 Outfall.
- Minimizing exposure to surface water near the 002 Outfall drainage.
- Minimizing, to the extent practicable, human consumption of fish from Indian Creek near the 002 Outfall.

Soil contamination is proposed to be addressed by leaving the contaminated soil in place, installing engineering controls, implementing appropriate institutional controls, and conducting monitoring in order to prevent access to soils or sediments that may be contaminated. The institutional controls (IC) will be an integral part of the proposed final remedy outlined in this SB. Continued sampling of surface water and groundwater is also proposed.

What is an Institutional Control?

An IC is a non-physical control that is exerted through legal documents, laws, ordinances, or the internal rules of an organization. ICs are used to limit human activities at a contaminated site to protect human health and the environment from exposure to the contaminants of concern, for as long as the contaminants remain above levels that would allow unrestricted use of the property. ICs are appropriate where contaminants remain in place and are not being transported in the environment. They help assure that human activities (e.g., excavation) do not mobilize the contamination.

The goals of the IC's are:

- To impose restrictions on the present and future use of real property to facilitate implementing and monitoring the corrective measures.

- To impose restrictions on the present and future use of real property in order to maintain and manage engineering controls to prevent migration of contaminated soil into surface water.
- To impose restrictions on the present and future use of real property to prevent human exposure to contaminants of concern in the soils, groundwater, and surface water.
- To impose restrictions on the present and future use of real property to ensure that the area will be used only for purposes that are compatible with the final remedy and will not be used in a manner that will cause a failure of the final remedy.

Institutional Controls for Changing Circumstances

In order to achieve the goals of the IC's it will be necessary to develop and implement controls which will continue even if DOE/National Nuclear Security Administration ceases to be present at the site or have custody. In order to assure the protectiveness of corrective measures in the event of a transfer of custody and control from DOE to another federal agency or a conveyance of a real property interest to some nonfederal person or entity, IC's will have to continue. Continuation of easements and restrictive covenants is currently in the Missouri Hazardous Waste Management Facility (MHWMF) Part I Permit. The Permit will continue to contain provisions which will retain the access agreement rights and the right to enforce the land use restriction to the United States, on behalf of DOE, and to the state of Missouri and its representatives, whenever DOE transfers custody or control to another entity. The MHWMF Part I Permit will transfer to new owners/operators, and is intended to be renewed as long as there is a need for monitoring, long-term stewardship, and IC's in order to provide for protection of human health and the environment. Compliance with IC's will have to be enforceable against whoever might have ownership, possession, and custody or control of the property. The 95th Terrace Site is the last parcel of the DOE KCP property that requires a final remedy. The proposed final remedy summarized in this SB and the supporting administrative record is accompanied by draft MHWMF Part I permit modifications, which address the requirements for final remedy implementation. Both the proposed final remedy and draft permit modifications for remedy implementation are open for public review and comment during the public comment period.

Land Use Restrictions and Conditions

The proposed final remedy includes provisions that would require that DOE refrain from using any property which it owns or controls at or near the KCP in any manner that would interfere with or adversely affect the integrity or protectiveness of the final remedy to be implementeed at the 95th Terrace Site. The proposed final remedy also includes provisions that would require DOE to incorporate into the current DOE facility security and internal land use permitting system, the following land use restrictions and conditions on that portion of the 95th Terrace Site area it owns. The land use restrictions for the 95th Terrace include but are not limited to the following:

a. Public access to all contaminated soil at the 95th Terrace Site shall be prevented to the extent practicable;
b. Any future construction or maintenance activities involving excavation of contaminated soil at the 95th Terrace Site shall include DOE internal permitting

controls consistent with Occupational Safety and Health Administration (OSHA) requirements regarding appropriate worker exposure protection and provide for the treatment and disposal of soil according to federal, state, and local regulations;

c. Buildings, structures, and pavement that currently cover portions of the 95th Terrace Site will not be removed or altered unless alternative corrective measures to keep precipitation and surface water run-off or run-on from coming into contact with contaminated soils and to minimize significant migration of soil contaminants into groundwater have been provided for and are approved in advance by DNR; and

d. Groundwater from the 95th Terrace Site shall not be used as a water supply for any purpose.

Notice to be Filed with Recorder of Deeds

DOE will file a notice in the property chain-of-title with the Jackson County, Missouri, Recorder of Deeds regarding the 95th Terrace Site which shall provide notice to all successors in title that the 95th Terrace-"areas" of the DOE KCP contain hazardous waste constituents and that corrective action measures have been chosen in a Statement of Basis to be implemented by DOE pursuant to a MHWMF Part I Permit MO9890010524 and that the use of the property is restricted in the manner described above. The form of the notice will be submitted to DNR as part of the draft Corrective Measures Implementation (CMI) Plan and filed within 45 days of approval by DNR.

Notice to Potential Transferees

The MHWMF Part I Permit requires that at least 60 days prior to the DOE's sale or transfer of any land within the 95th Terrace Site or any site subject to IC's owned by DOE, that DOE give the buyer or transferee written notice of the following:

- The KCP's MHWMF Part I Permit and EPA Hazardous and Solid Waste Amendments of 1984 Part II Permit
- The *95th Terrace Site Statement of Basis,* or SB for the applicable area
- Any access agreements and easements for the site
- Any restrictive covenants and easements for the site
- Acknowledgement of DNR permit requirements and modifications necessary to complete transfer of the land. Copies of the notice will be sent to DNR and EPA.

Plan for Continuation of Institutional Controls in the Event of a Transfer or Conveyance

DNR proposes the continuation of appropriate IC's in the event of a transfer of the custody and/or control of the 95th Terrace Site, or the conveyance of any interest therein. This shall be accomplished by the recording and implementation of access and land use restriction easements prior to any such transfer or conveyance. These easements will be granted under the authority of Section 319, 40 US Code (40 USC 319) or Section 161 of the Atomic Energy Act, as appropriate.

A. Access Easement

The plan will provide for an easement running with the land that will be filed and recorded in the Recorder's Office of Jackson County, state of Missouri, prior to or upon the conveyance of any interest in property or the transfer of custody and/or control of any real property located at the 95th Terrace areas currently under the custody and control of DOE, including, but not limited to, fee interests, leasehold interests and mortgage interests. Such easement will grant the right to enforce the land use restrictions listed below to the United States, on behalf of DOE, and to the state of Missouri and its representatives, and to enforce those provisions that are otherwise necessary to implement, ensure non-interference with, or ensure the protectiveness of the final remedy provided for in this SB, the corresponding CMI Work Plan, or the MHWMF Part I Permit including, but not limited to the following:

i. Monitoring the Work;
ii. Verifying any data or information submitted to the United States or the state of Missouri;
iii. Conducting investigations relating to contamination at, near, or migrating from the 95th Terrace areas;
iv. Obtaining samples;
iv. Assessing the need for planning or implementing additional response actions at or near the 95th Terrace areas;
v. Implementing the work pursuant to the conditions set forth in the SB or the modified MHWMF Part I Permit;
vi. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by DOE or their agents;
viii. Assessing DOE's compliance with the modified MHWMF Part I Permit; and
ix. Determining whether the 95th Terrace area or other property at the KCP is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted, by this SB or by any restrictive easements filed pursuant to this SB or the modified MHWMF Part I Permit.

B. Land Use Restrictions Easement.

The plan will provide for an easement running with the land that will be filed and recorded in the Recorder's Office of Jackson County, state of Missouri, prior to or upon conveyance of any interest in property or the transfer of custody and/or control of any real property located in the 95th Terrace Site that is owned by DOE including but not limited to fee interests leasehold interest, and mortgage interests and such easement will grant the right to enforce the land use restrictions listed below or to enforce those that are otherwise necessary to implement, ensure non-interference with, or ensure the protectiveness of the final remedy provided for in this SB, the corresponding CMI workplan and the MHWMF Part I Permit including but not limited to the following:

a. Public access to all contaminated soil at the 95th Terrace Site shall be prevented to the extent practicable;

b. Any future construction or maintenance activities involving excavation of contaminated soil at the 95th Terrace Site shall include DOE internal permitting controls consistent with Occupational Safety and Health Administration requirements regarding appropriate worker exposure protection and provide for the treatment and disposoal of soil according to federal, state, and local regulations;
c. Buildings, structures, and pavement that currently cover portions of the 95th Terrace Sites will not be removed or altered unless alternative corrective measures to keep precipitation and surface water run off or run on from coming into contact with contaminated soils and to minimize significant migration of soil contaminants into groundwater have been provided for and are approved in advance by DNR;
d. Groundwater for the 95th Terrace Site shall not be used as a water supply for any purpose; and
e. The 95th Terrace Site shall not be used for any purpose other than industrial.

C. The restrictive covenants (easements) shall be drafted so as to be enforceable under the laws of the state of Missouri, free and clear of all prior liens and encumbrances (except as approved by the DNR), and acceptable under the U.S. Attorney General's Title Regulations promulgated pursuant to 40 U.S.C. § 255.

D. The restrictive covenants shall be drafted so as to retain or grant the Access Easement rights and the right to enforce the Land Use Restriction Easement to the United States, on behalf of DOE and its representatives and to the state of Missouri and its representatives. The DNR, to the extent allowed by Missouri law, shall also be a third party beneficiary of the rights and benefits conveyed to the grantees in the easements.

Compliance with Comprehensive Environmental Response, Compensation and Liability At Superfund Section 120(h)

If DOE plans to sell or otherwise transfer title to all or part of the 95th Terrace Site, DOE shall comply with the applicable requirements of Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (41 USC 9620h) and EPA's implementing regulations found at 40 CFR Part 373.

DOE will continue to evaluate innovative treatment technologies for remediating soil and sediment at the 95th Terrace Site. Should an appropriate technology be found in the future, DOE may propose additional remedies based on that technology.

Institutional Controls for Soil Not on Kansas City Plant Property

Much of the contamination is present below 95th Terrace at depths greater than 30 feet. Although deep borings were not completed below Bannister Road and its embankment, PCBs are present within the old Indian Creek channel to the location of the current discharge outlet on the culvert and in sediments in Indian Creek. Some PCB containing soils were left in the area of the 002 Raceway (the concrete chute that conveys stormwater discharge to Indian Creek from the 95th Terrace Site as well as other parts of the DOE KCP) following remediation in 1988. The EPA allowed PCBs to remain in the soil at approximately 1 mg/kg to 4 mg/kg provided that the area was covered with approximately 4 feet of clean fill. This area is not on KCP property. That

portion of the 95th Terrace Site including Bannister Road (95th Street) and land just to the south of Bannister road running to Indian Creek is owned by the Missouri Department of Transportation (MoDOT). IC's described for the KCP property are not applicable to off-site property at this time. However, DNR, DOE, and MoDOT are currently discussing deed restrictions and controls on construction that could be implemented in cooperation with MoDOT to minimize intrusive activities that could potentially disturb PCB-contaminated soil. The majority of soil contamination associated with the 95th Terrace Site that is off the KCP property is present at depths of 30 feet or greater and would not be encountered during routine maintenance activities on 95th Terrace or Bannister Road. The exposure assessment and calculation of clean-up goals identified repair or replacement of the box culvert within the 002 storm sewer system as the potential activity resulting in human exposure to the contaminated soil. This could not be completed without the knowledge of the MoDOT and DOE, or any future owner/operator. This makes unmanaged disturbance of these soils very unlikely.

The proposed corrective measures are described in greater detail in the "Summary of Alternatives" section of this document.

SUMMARY OF SITE RISKS

The following paragraphs summarize potential risks at 95th Terrace posed by soil, sediment, and surface water.

Ecological Risk Assessment

An ecological risk assessment was conducted that considered risks to plant and animals living in Indian Creek and the adjacent riparian corridor that would be exposed to impacted surface water, sediments, and food sources. The study looked at five species of birds and mammals that are likely to feed on fish and insects from that portion of Indian Creek where PCBs have been detected. The ecological risk assessment concluded that risks associated with PCBs from the 95th Terrace Site are low for all five receptor species, and that no corrective actions were necessary to comply with ecological based criteria.

Human Health Risk Assessment

Soils

At the KCP, receptor populations that are potentially exposed to soils are identified as construction workers engaging in intrusive soil activities. The clean-up goals developed for the 95th Terrace soils assume unprotected workers. Exposure pathways assume workers are not apprised of the presence of PCBs and, therefore, do not take the appropriate safety precautions. These assumptions are quite conservative as the KCP has programs in place to ensure this information is shared with workers and that necessary personal protective equipment is worn to mitigate exposure to contaminants. Major exposure pathways identified for this receptor group are:

- Incidental ingestion of contaminated soil
- Dermal contact with contaminated soil

Based upon the risk assessment the following PCB cleanup goals are recommended for the 95th Terrace Site:

- For shallow soils (<10 feet) a cleanup goal of 6 mg/kg is recommended. This cleanup goal is applicable to workers performing common construction/excavation activities at the 95th Terrace Site, such as road maintenance, burying of utility lines, etc. Table 3.11 of the RFI Report for the 95th Terrace supports that this goal (< 6 mg/kg) has been met.
- For deep soils (>10 feet) a clean-up goal of 6 mg/kg is recommended. This clean-up goal is applicable to workers performing maintenance on the outside of the box culvert at the 95th Terrace Site. Exposure to PCB contaminated soils in excess of the clean-up goal is addressed by implementing IC's, which ensure that workers will not come into contact with such soils.

Indian Creek Sediment

At the KCP, receptor populations potentially exposed to sediments are identified as construction workers and adult or child recreational users of Indian Creek. Anglers who may consume fish from the creek could be (not all fish are contaminated) exposed via the fish consumption pathway (see below). No residential exposure scenarios are present at the site although anglers are assumed to be local residents. Potential exposure pathways identified for the construction worker and recreational receptor are:

- Incidental ingestion of contaminated sediment
- Dermal (skin) contact with contaminated sediment

So that the target cleanup goals are protective of human health, conservative intake factors, and exposure assumptions were used to develop the recommended clean-up goals for sediments at the 95th Terrace Site.

Based on this comparison, for sediments in Indian Creek a clean-up goal of 4.9 mg/kg is recommended. This clean-up goal is based on the recreational child scenario and is protective of workers performing common construction/excavation activities. Ongoing monitoring required by the CMI will monitor PCB levels in sediment to ensure the goal continues to be met.

Surface Water

At the 95th Terrace Site, receptor populations potentially exposed to surface water are identified as construction workers, recreational receptors (i.e., children or adults wading in the creek), and anglers who may consume fish from the creek. Potential exposure pathways identified for the construction worker and recreational receptor are:

- Incidental ingestion of contaminated surface water
- Dermal contact with contaminated surface water

As a result of performing the risk assessment for surface water, a clean-up goal of 0.26 μg/L is recommended. Supporting calculations are found in Section 3.2.3 of the CMS for the 95th Terrace. This clean-up goal is based on the child recreational receptor and is protective of

workers performing common construction/excavation activities and recreational users of the creek near the 95th Terrace Site. Table 2.2 of the CMS summarizes the recent surface water sampling with detections ranging from 0.0011ug/L to 0.0027 ug/L, which is less than 0.26 ug/L. During 2003, the Outfall 002 effluent 0.49 ug/L exceeded 0.26 ug/L; however, the risk is being managed by the installation of a cage on the raceway preventing access to the raceway, and the signs that advise people not to drink water, wade, swim, or eat fish where the effluent enters Indian Creek.

Indian Creek Fish

The EPA target risk range for total lifetime incremental excess cancer risk is 1×10^{-4} to 1×10^{-6}. This is one additional person out of 1,000,000 (1×10^{-6}) to one person out of 10,000 (1×10^{-4}). For fish in Indian Creek, the concentration of PCBs in fish that would yield a risk of 1×10^{-4} to 1×10^{-6} was calculated based on the assumptions in the Baseline Risk Assessment for fish ingestion. This data is summarized below:

Risk Level	Allowable Concentration of PCBs in Fish	Current Average PCB Concentration in Fish (Catfish)
$1x10^{-4}$	1.59 mg/kg	0.07 mg/kg
$1x10^{-5}$	**0.159 mg/kg**	**0.07 mg/kg**
$1x10^{-6}$	0.0159 mg/kg	0. 07 mg/kg

This goal is being met. The fish tissue sample results from November 2002, indicated 0.07 mg/kg in catfish near Outfall 002. The sample was taken from the filet. The average concentration of 0.07 mg/kg represents a risk of 4.4×10^{-6}, which is within the allowable risk range. Note the 0.159 mg/kg was determined from the site specific risk assessment and includes exposure to sediment, water, and fish. It includes dermal and ingestion routes of exposure. That is why 0.159 mg/kg (parts per million) is below the 2 ug/g (also parts per million) Food and Drug Administration level referenced in the RFI mentioned earlier in this document. The 95th Terrace CMS requires periodic monitoring of fish tissue levels to ensure the goal continues to be met.

SCOPE OF THE PROPOSED CORRECTIVE ACTION

The recommended alternative for 95th Terrace soils includes implementation of IC's, Engineering Controls, and Monitoring to achieve the Corrective Action Objectives for the site. These objectives include:

- Minimize exposure of potential receptors to soil contamination in excess of the risk-based clean-up goals for soil of 6 mg/kg (deep soils) and 6 mg/kg (soils less than 10 feet deep)
- Minimize infiltration for PCB-contaminated soil at the 95th Terrace Site into the box culvert for the 002 Outfall

The proposed remedy for the 95th Terrace Site provides IC's, engineering controls, and monitoring to meet the corrective action objectives. This remedy protects human health by minimizing exposure to PCBs in soils above the health-based clean-up goal of 6 mg/kg. The

majority of contamination at 95th Terrace soils is at depths greater than 30 feet, so routine activities would not result in exposure to contaminated soil. IC's already in place on the KCP property would ensure any construction which could potentially disturb contaminated soil would be completed in coordination with DNR utilizing appropriate health and safety procedures. In addition, access and deed restrictions for contaminated soil on property not owned by DOE are being pursued by DOE and DNR with MoDOT. This would ensure that any intrusive construction activities within the 95th Terrace Site located off the KCP property would be properly managed. The only major potential exposure pathway for soils identified for the site would be during repair or replacement of the box culvert. The box culvert located approximately 30 feet underground within the regulated 002 stormwater system will be routinely inspected and maintained to keep contaminants outside the box culvert from entering and subsequently discharging to Indian Creek.

The engineering controls to be implemented as part of the final remedy include installation and maintenance of a protective cage over the structure called the Outfall 002 Raceway. This protective cage was proactively installed by DOE in 2004. The Outfall 002 Raceway is a concrete structure that runs from the 002 stormwater discharge point to the channel of Indian Creek. Installation of the protective cage eliminates potential human exposure to the 002 Outfall effluent and sediments within the raceway where PCB concentrations may be higher. Signs have also been proactively installed by DOE in the area of the 002 Outfall advising people not to drink water, wade, swim, or eat fish caught in Indian Creek near the 002 Outfall. Posting and maintenance of these signs is also a component of the proposed final remedy and is designed to lower the potential for exposure to PCBs at the site and to minimize potential impacts to human health.

These controls are designed to minimize exposure to the 002 Outfall effluent and PCB contaminated sediments near the 002 Outfall by discouraging fishing, wading, and swimming in Indian Creek near the 002 Outfall. The health-based clean-up goals applicable to Indian Creek sediments include the following:

Construction Worker - 6 mg/kg
Recreational Receptor, Child - 4.9 mg/kg
Recreational Receptor, Adult - 5.3 mg/kg

Institutional and engineering controls proposed as part of the final remedy will help reduce PCBs in Indian Creek sediment, in part, by removing sediment from within the storm sewer system before it reaches the outfall and inspecting and maintaining the integrity of the 002 storm sewer system. Recent sediment samples collected from Indian Creek had concentrations of PCBs below the clean-up goals presented above. Only a construction worker working in the box culvert in the storm sewer itself or the now "caged" raceway would potentially be exposed to sediments containing PCBs above 6 mg/kg.

Recent PCB concentrations measured in the 002 Outfall effluent (water) have varied somewhat, sometimes exceeding the discharge limit of 0.5µg/L as specified in the Missouri State Operating Permit; MO-0004863 issued by the DNR Water Protection Program. Although the permitted discharge limits are sometimes exceeded, it should be noted that the actions taken by DOE have

significantly reduced the amount of effluent discharge through Outfall 002 thus greatly reducing the mass of PCBs discharging to Indian Creek. Additional and ongoing source control measures implemented by DOE are expected to further reduce PCB concentrations in the Outfall 002 effluent and the mass of PCBs entering Indian Creek over time.

Recent fish tissue sampling in Indian Creek completed by DOE shows a downward trend in concentrations of PCBs in fish when compared with historical fish tissue sampling results. The most recent fish tissue sample results meet the corrective action objectives.

SUMMARY OF ALTERNATIVES

The following paragraphs summarize proposed corrective measure alternatives for soil, sediments, and groundwater evaluated in the CMS for the 95th Terrace Site.

Soil

Alternatives to address soil contamination include the following:

1. No Action
2. Institutional and Engineering Controls
3. Excavation with off-site disposal

Sediment

For sediments near the 002 Outfall the following alternatives were evaluated

1. No Action
2. IC's, Engineering Controls, and Monitoring
3. Institutional, Engineering Controls, Monitoring, and 002 Outfall Effluent Treatment
4. Institutional, Engineering Controls, Indian Creek Sediment Removal, and Monitoring Controls

Groundwater

Groundwater samples were collected during the RFI and found to contain PCBs above the drinking water standard of 0.5 µg/L. The RFI Report concluded that PCBs in groundwater are not mobile at concentrations above the PCB drinking water standard.

The RFI presented groundwater flow and contaminant transport modeling for the 95th Terrace Site. WinTrans, a two-dimensional steady-state analytical groundwater flow and contaminant transport model developed by Environmental Simulations, Inc., was used to simulate the 95th Terrace groundwater flow and contaminant transport at the 95th Terrace Site.

Because there is no PCB groundwater plume to replicate, the modeling exercise focused on determining if PCBs could migrate to Indian Creek within a reasonable time period. Despite the use of conservative input parameters, including a groundwater source area concentration approximately ten times greater than observed, the RFI modeling shows that PCBs are not

expected to reach Indian Creek within 1000 years. The land use restrictions also prohibit use of the groundwater for any purpose. Based on the findings of the RFI, the potential that 95th Terrace PCBs will migrate in groundwater is minimal, if not nonexistent. Only monitoring and IC's are required for groundwater at the 95th Terrace Site. Note that IC's prohibit groundwater use at the KCP for any purpose due to contamination with volatile organic compounds at other parts of the facility. Ongoing monitoring is also required to assure that the plume is stable and that volatile contaminated groundwater is not moving toward the 95th Terrace Site. This was part of the final remedy for the Multiple Sites CMS.

EVALUATION OF REMEDIAL ALTERNATIVES FOR SOILS

Alternative 1: No Action

The No Action alternative is included as a baseline for evaluation of the other alternatives.

Alternative 2: Institutional and Engineering Controls

Corrective Actions Completed for Soils at the 95th Terrace Site

Numerous corrective actions have been taken over the last several years to lower PCB concentrations in the 002 Outfall discharge. Although soils at the 95th Terrace Site are not a major source of PCBs in the 002 Outfall, actions have been taken to minimize infiltration of PCB-containing soils into the 002 Outfall. The actions included the following:

- Two soil removal projects were completed in the Plating Building Area in 1995 and 1997. The contaminated soils that were removed were located above the storm sewer laterals that drain from the southeast corner of the MMB into the 002 Outfall system.
- Removal and off-site disposal of 27,210 tons of PCB-contaminated soil from the AICO Area was completed in 1993.
- Grout injection was completed to address seeps identified at two joints in the box culvert within the 002 storm sewer. Four additional pipe joints were grout sealed in August 2003.
- PCB contaminated soils (1600 tons) in the area of the current 002 Raceway were removed and disposed of off-site in 1988.
- Manholes in the sewer system were lined in 1984 to minimize infiltration of contaminants in the system. These manhole modifications were the most effective of the remedial efforts reducing 002 Outfall discharge PCB concentrations from approximately 100 µg/L to between 1 and 10 µg/L.
- Storm sewer laterals were lined with Insituform in 1985 and 1988 to prevent infiltration of contaminated soil. This action further lowered PCB concentrations in the 002 Outfall effluent discharge to < 1 µg/L. Numerous service laterals were resealed in August 2003.

PCBs are still detected in the 002 Outfall effluent (water) in concentrations that vary from below detection limits to slightly above the 002 Outfall permit level of 0.5 µg/L. The source of the PCBs is not from the 95th Terrace Site soils but rather soils in the area near the operating

department where the two historical spills occurred. This area is covered by IC's and addressed by the Multi-Sites CMS. Several small seeps, that transport soil particles, have been identified in the box culvert in the 95th Terrace area during routine annual inspections conducted since 1998. Leaking joints have been sealed to eliminate the seeps. Sewer line inspection and maintenance will continue in the future. As described above, the lining of manholes and Insituform lining of upgradient sewer laterals had a much larger impact on reducing PCBs than the removal of a large volume of soil from the AICO area.

Previously 002 Outfall had a base flow of about 100 GPM, mainly comprised of single pass cooling water. This water came from the city's public water supply, and when discharged to Indian Creek, contained too much chlorine to meet discharge limits. As a result of rerouting the single pass cooling water, base flow was reduced to 5 to 10 GPM. Due to reduced flow, meeting the discharge limit of 0.5 ug/L was still an issue with the SOP. A base flow reroute system was installed in March 2005 to divert non-rain flow (the 5 to 10 gpm) from 002 Outfall to the KCP's existing groundwater treatment system. This results in 002 Outfall only discharging water during rain events. This reduction still produces periodic spikes in PCB levels above 0.5 ug/L. Although the permitted discharge limits are sometimes exceeded, it should be noted that the actions taken by DOE have significantly reduced the mass of PCBs discharging to Indian Creek.

Engineering and Institutional Controls for Maintenance of Box Culvert Within the 002 Storm Sewer

The recommended alternative includes actions to ensure long-term integrity of the box culvert and minimize infiltration of contaminated soil from beneath the box culvert into the system. The controls to be implemented include:

- Semi-annual visual inspection and documentation of the condition of the inside of the box culvert.
- Cracks or seeps identified in the box culvert will be sealed within 180 days of being identified during the semi-annual inspection. Repairs will be made sooner if possible.
- Sediment removal will be scheduled when the semi-annual inspection detects accumulated sediment in the box culvert at the sluice gate junction box greater than one-inch thick.
- Monitoring of the 002 stormwater discharge will be performed on a bi-monthly basis at the flap gate at the 002 discharge.

Institutional Controls for PCB Contaminated Soils at the 95th Terrace Site on KCP Property

An IC is a non-physical control that is exerted through legal documents, laws, ordinances, or the internal rules of an organization. They are used to limit human activities at a contaminated site to protect human health and the environment from exposure to the contaminants of concern, for as long as the contaminants remain above levels that would allow unrestricted use of the property.

The goals of the IC's are:

- To restrict the present and future access to real property for all parties as necessary for implementing, facilitating, and monitoring the corrective measure.

- To impose restrictions on the present and future use of real property in order to maintain and manage engineering controls to prevent migration of contaminated soil into surface water.
- To impose restrictions on the present and future use of real property to prevent human exposure to contaminants of concern in the soils, groundwater, and surface water.
- To impose restrictions on the present and future use of real property to ensure that the 95th Terrace Site will be used only for purposes that are compatible with the final remedy and will not be used in a manner that will cause a failure of the final remedy.

Procedural Controls

The KCP has an extensive system of written procedures to assure quality and consistency in its enterprise and sound environmental management. The quality system, certified under International Standards Organization Standard 9001, ensures that all activities at the KCP are planned, the activities are performed in a predetermined manner, and that there are clearly defined channels for communicating information and instructions. The environment, safety, and health (ES&H) management system, certified under International Standards Organization Standard 14001, ensures that consideration is given to human health and the environment in plant activities, and communicates ES&H requirements to plant workers. Several of the procedural controls influence compliance with environmental regulations and protection of plant workers and the public. These procedural controls are applied to many types of activities at all locations at the KCP.

The only potential complete exposure pathway for contaminated soils identified at the 95th Terrace Site is for construction workers involved in excavation or other intrusive work that would disturb subsurface soils. The procedural controls described here work to minimize exposure of workers involved in excavation and other intrusive activities at the portion of the 95th Terrace Site that is owned by DOE.

There are seven procedural controls that precede any soil excavation at the KCP:

1. Hazardous Waste Operations and Emergency Response (HAZWOPER) determination
2. Preliminary hazard analysis (PHA)
3. Excavated soil management procedure
4. Construction waste assessment
5. Design review process
6. Construction safety plan
7. Excavation permit system

The first four controls are exercised when a construction project is in the conceptual stage so that any special requirements related to worker safety, waste management, and environmental protection are addressed in the design, contract documents, and project budget. Personnel in the KCP ES&H Departments exercise the fifth control point during review of construction design documents to ensure that ES&H concerns have been addressed in the documents. The sixth and seventh controls are exercised when projects enter the construction phase.

HAZWOPER Determination

The HAZWOPER determination is performed to identify construction projects (or portions of projects) that are subject to the requirements of 29 CFR 1910.120. This regulation is an OSHA standard that focuses on worker safety when handling hazardous wastes, performing environmental remediation, and emergency cleanup of spilled hazardous materials.

Preliminary Hazard Analysis

The PHA is a systematic process that provides a formal review of proposed changes to the KCP that have the potential to affect the safety and health of people, or to create discharges to the environment. The PHA is conducted by KCP departments responsible for ES&H matters. A PHA is required for all construction projects, new production processes, and any other new activity that will generate waste.

In the case of a construction project that will require excavation at the 95th Terrace Site, the project engineer will initiate the PHA review by completing a form called a PHA Checklist. The checklist is used to identify project activities that could have ES&H consequences. The completed checklist is submitted with supporting information such as construction drawings or a written description of the work to be performed. ES&H personnel review the checklist. If excavation is noted on the checklist, an ES&H reviewer will check the excavation location for presence of soil contamination by reviewing the 95th Terrace RFI Report. If the excavation is to occur at the 95th Terrace Site, the reviewer will list action items and/or recommendations related to the soil contamination on the PHA report. The PHA report will be returned to the project engineer, who must complete the action items and consider the recommendations before the project begins.

Excavated Soil Management Procedure

Repair and maintenance of utilities within the 95th Terrace Site could require excavation of contaminated soil. The excavated soil management procedure allows DOE, with MDNR approval, to use some or all of the contaminated soil to refill the excavation from which it was derived. This practice reduces the amount of RCRA-regulated waste produced, and is consistent with the chosen corrective measure.

As noted in the preceding section, ES&H personnel review construction project plans during the PHA. If excavation of contaminated soil is indicated on the plans, a reviewer will determine if the excavated soil management procedure could be utilized. The reviewer then checks to determine if prior analytical data exists in the immediate area of the proposed excavation. If none exists the reviewer arranges for sampling and analysis of the soil to be excavated. The sampling data and a site map are submitted to DNR at least 15 days prior to the work, requesting reuse of contaminated soil as backfill material. The map shows the location and depth of excavation, the locations and depths of soil samples, and the locations of RCRA-regulated units, solid waste management units, and/or releases from such units. If DNR approves the request, reuse of the contaminated soil will be reflected in the construction waste assessment and the construction documents (specifications and drawings). As a minimum, the top four inches of backfill material must be clean soil (no contaminants above background concentrations). Any contaminated soil that is excavated but not reused must be managed and disposed of in accordance with applicable local, state, and federal requirements.

Excavation of contaminated soil for purposes other than repair and maintenance of utilities requires submittal of a work plan to DNR for its approval.

Construction Waste Assessment

This procedural control assures that any hazardous or toxic waste generated from excavation at the 95th Terrace Site is managed appropriately. One of the PHA reviewers is a waste classifier, who studies the PHA Checklist and supporting information to determine what types of wastes will be generated by the construction project. On a construction project that involves excavation of soil at the 95th Terrace Site, the waste classifier will examine available sampling data (i.e., an RFI report and/or sampling done to determine the classification of any waste soil that may result from the project). If necessary, additional samples are obtained and analyzed.

If the soil would be classified as a hazardous or toxic waste, the classifier prepares a waste profile. The profile is submitted to licensed disposal sites to assure that the waste will be accepted there. If necessary, arrangements are made for new disposal contracts. The classifier also prepares a waste identification table for the manager of the construction project. The waste identification table provides the waste classifications and instructions for handling the waste before it leaves the KCP, such as segregation of waste streams and the type of waste containers to use.

Design Review

The design review process provides for examination of construction documents (specifications and drawings) by several KCP departments. Among the departments that review the construction documents are those responsible for ES&H matters. The purpose of the review is to assure that concerns of the various departments are addressed by the documents. If a construction project requires excavation at the 95th Terrace Site, the design review will assure that the construction documents contain requirements for compliance with environmental and waste management regulations, worker safety and health protection, and environmental protection.

Construction Safety Plan

Each construction contract issued at the KCP requires the construction contractor to prepare a project-specific safety plan for the company's employees and subcontractors. The construction safety plan must be reviewed and accepted by a KCP safety professional prior to the start of construction.

Construction safety plans are required to describe the safety, health, fire, and environmental hazards anticipated by the contractor as well as the contractor's plans for eliminating or minimizing those hazards. For projects that include excavation in the 95th Terrace Site, the construction safety plan will also address levels of personal protective equipment, decontamination areas, work zone boundaries, site controls, material safety data sheets, and emergency notification procedures per the HAZWOPER standard (40 CFR 1910.120 and Hazard Communications 29 CFR 1910.1200).

Excavation Permit

The excavation permit system is a safeguard; an opportunity just before excavation begins for KCP personnel concerned with environmental protection and worker safety to assess the planned excavation procedures and equipment. The permit system assures that the construction contractor intends to perform the excavation work safely and in accordance with the environmental protection aspects of the construction specifications. A KCP environmental protection specialist, a KCP safety engineer, the KCP manager of the construction project, and the contractor's safety representative must sign the permit form before excavation is allowed to begin.

Proprietary Controls

Certain proprietary controls will be implemented at the 95th Terrace site owned by DOE to:

- Assure that DOE, DNR, and EPA have the legal right to enter the site as necessary to implement, facilitate, and monitor the final remedy.
- Assure that existing engineering controls are maintained to prevent human exposure to the soil contaminants.
- Restrict activities at the 95th Terrace Site to prevent human exposure to the soil contaminants.
- Restrict use of the land occupied by the 95th Terrace Site to activities that are compatible with, and will not cause a failure of, the final remedy, and to ensure that IC's continue to protect human health and the environment for as long as soil contamination exists above levels that would allow unrestricted use of the land.

Access Easement

If DOE transfers custody of any KCP real estate to another federal agency, or if DOE leases or sells any of its KCP real estate, the transaction will include an access easement. The easement will give DOE, DNR, and EPA the legal right to enter the property for activities related to implementation of the final remedy. Examples of such activities include monitoring work, verifying data, conducting investigations, obtaining samples, assessing the need for additional corrective actions, performing corrective actions, inspecting records, checking compliance with the MHWMF Part I and EPA HSWA Part II Permits for the KCP and verifying proper land use.

Land Use Restrictions and Conditions

DOE will incorporate the following land use restrictions into its internal system of procedural controls to maintain the effectiveness of the engineering and procedural controls now and in the future. These restrictions will remain in effect as long as soil contamination exists above levels that would allow unrestricted use of the land. DOE will implement rules to:

- Maintain existing or comparable security measures (as described previously in this document) to restrict access to the 95th Terrace Site owned by DOE. By restricting access to the site, only people with specific, planned, and approved purposes will be allowed to engage in activities that could expose them to the soil contaminants.
- Maintain existing or comparable procedural controls to safely manage excavation in the 95th Terrace Site soils.

- Ensure that groundwater from the 95th Terrace Site will not be used as a water supply for any purpose.
- Use the land at the 95th Terrace Site (not including Indian Creek) in a manner that is consistent with assumptions made in developing clean-up goals (i.e., maintain industrial land use). The clean-up levels are based on the assumption that only a limited number of people will be potentially exposed to contaminated soils, for brief periods of time, and under highly controlled conditions. Industrial land use with occasional excavation for construction or maintenance work is consistent with that exposure assumption.

Land Use Restriction Notice

DOE will file a notice with the Jackson County, Missouri, Recorder of Deeds regarding the 95th Terrace Site. If title to land containing any of the 95th Terrace Site is ever to be transferred, the notice will advise the prospective owner of the known soil contamination. At least 60 days prior to conveyance, or transfer of custody or control, of any real property, DOE shall record an access easement and a land use restriction easement with the Recorder of Deeds for Jackson County, Missouri, as per the MHWMF Part I Permit.

Notice to Potential Transferees

At least 60 days prior to the sale or transfer of any land within the 95th Terrace Site owned by DOE, DOE will give the buyer or transferee written notice of the following:

- The KCP's MHWMF Part I Permit (DNR, 1999) and EPA HSWA Part II Permit
- The 95th Terrace Site SB
- Any access agreements and easements for the 95th Terrace Site
- Any restrictive covenants and easements for the 95th Terrace Site
- Acknowledgement of DNR permit requirements and modifications necessary to complete transfer of the land

Copies of the notice(s) will be sent to both DNR and EPA.

Plan for Continuation of Institutional Controls

The continuation of appropriate IC's in the event of a transfer of the custody and/or control of the 95th Terrace Site, or the conveyance of any interest therein, shall be accomplished by the recording and implementation of access and land use restriction easements prior to any such transfer or conveyance. These easements will be granted under the authority of Section 319, 40 US Code (40 USC 319) or Section 161 of the Atomic Energy Act, as appropriate. Any new owner/operator for parts of the facility that are subject to the MHWMF Part I Permit, shall acknowledge the financial responsibility associated with the IC's, ongoing monitoring, and periodic maintenance of the site. A state or federal agency shall identify the funds in their budget request annually and provide this information by letter to the DNR and EPA. A private entity shall acquire a form of financial assurance approved by DNR prior to closing on the transfer of property, to assure the funding of activities associated with the MHWMF Part I

Permit requirements and long-term stewardship. In lieu of this, DOE may elect to continue performing this work through previously discussed access agreements, and continue to submit the annual funding report as required by the MHWMF Part I Permit.

Any new owner/operator will be added to the MHWMF Part I Permit as a permittee and will be subject to the requirements of the permit. This assures that the new owner/operator manages the property in a manner that does not interfere with the final remedy or the maintaining of the IC's.

Compliance with Comprehensive Environmental Response, Compensation and Liability Act Superfund Section 120(h)

If DOE plans to sell or otherwise transfer title to all or part of the 95th Terrace Site, DOE shall comply with the applicable requirements of Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (41 USC 9620h), and EPA's implementing regulations found at 40 CFR Part 373.

Institutional Controls for soil not on KCP Property

Much of the soil contamination at the 95th Terrace Site is present at depths greater than 30 feet. Although deep borings were not completed below Bannister Road and its embankment, it is likely that PCBs are present along and within the old Indian Creek channel to the location of the current discharge point of the 002 Outfall and in sediments in Indian Creek at the point where the outfall empties into the creek. Some PCB containing soils were left in the area of the 002 Raceway following remediation in 1988. These soils were covered with approximately four feet of clean fill. The EPA established cleanup level for this remediation project allowed PCBs to remain at approximately 1 mg/kg to 4 mg/kg. This area is not on KCP property. The property is owned by MoDOT. IC's described for KCP property are not applicable to off-site property. However, DNR, DOE, and MoDOT are currently discussing deed restrictions and controls on construction that could be implemented in cooperation with MoDOT to minimize intrusive activities that could potentially disturb PCB-contaminated soil. The majority of soil contamination associated with the 95th Terrace Site that is off the KCP property is present at depths of 30 feet or greater and would not be encountered during routine maintenance activities on 95th Terrace or Bannister Road. The exposure assessment and calculation of cleanup goals identified repair or replacement of the box culvert as the potential activity resulting in human exposure to the contaminated soil. This could not be completed without the knowledge of the DOE, or future owners/operators of the property. This makes unmanaged disturbance of these soils very unlikely**.**

The box culvert is an integral part of the flood protection system at the Bannister Federal Complex. The main collector line is routinely inspected as part of the periodic maintenance to identify and remove PCB contaminated sediments. Engineering controls for the maintenance of the box culvert have been in place for many years (e.g., inspection, sealing joint seeps). Activities to maintain the integrity of the box culvert have been conducted since the early 1980s. These activities have included:

- Sealing joint leaks in the box culvert through chemical grouting
- Inspection of the box culvert of the 002 storm sewer and sediment removal
- Using Insituform to line lateral stormwater lines entering the 002 Outfall

Alternative 3 - Excavation With Off Site Disposal

Alternative 3 involves excavation of PCB contaminated soils and off-site disposal at a Toxic Substances Control Act Landfill permitted to accept PCB contaminated solids. The RFI Report for the 95th Terrace Site summarized the horizontal and vertical extent of PCB contamination. The clean-up goals recommended in the CMS determined that a clean-up goal of 6 mg/kg (PCB concentration) is appropriate for soils at the KCP. Although it is likely that some soil under the Army Corps of Engineers flood control levee and Bannister Road contains PCBs above 6 mg/kg, the analysis in the CMS indicated that it is improbable that these areas will be excavated. Excavation of the PCB-contaminated soils in this area would require significant disturbance of the flood control levee and long-term closing of 95th Terrace and/or Bannister Road. A significant risk of flooding during a higher water period would be present during the project due to disturbance of the levee and compacted clay surrounding the 002 box culvert. The excavation would be very large to allow proper shoring of the hole and would require many months to complete. The risk to human health and the environment would likely be higher due to the excavation than any risk presented by the deep soil containing PCBs under the flood control levee and 95th Terrace. For the purposes of identifying excavation limits and depths for this alternative, it was assumed that soils exceeding 6 mg/kg PCB contamination upstream of the levee would be excavated and disposed of offsite.

Based on a review of the RFI, two areas with soils exceeding 6 mg/kg were identified. The first area is approximately 100 feet by 60 feet in plan and is positioned directly under 95th Terrace and just north of Bannister Road and the levee system. The second area is about 70 feet by 50 feet in plan and is located immediately east of the former AICO excavation. Available boring and laboratory test data within the RFI show that PCB concentrations exceeding 6 mg/kg in these areas are primarily within soils below the base of the box culvert. For the purposes of developing a preliminary excavation plan and estimating material quantities, it has been assumed that all soils below the top of the culvert (approx. Elevation 772) will require excavation and off-site disposal.

Available boring information shows that the proposed excavation materials generally consist of low to medium plastic silty clay fill containing abundant limestone debris above the level of the box culvert. The base of the box is apparently supported on fill of variable thickness and 5 to 10 feet of natural alluvium. This alluvium is typically characterized as clayey with occasional basal gravel just above shale bedrock. Borings indicate that the shale surface is relatively consistent in elevation at about 755 to 756 feet. The elevation of groundwater reported in the borings was variable, but typically ranged from 5 to 10 feet above the shale bedrock.

Development of a preliminary excavation plan has been directed at the following objectives:

- Provide a stable excavation extending to shale bedrock with areal limits that minimize disruption and potential negative impacts (e.g., loss of stability) to nearby surface (streets) and subsurface (utilities) features, and the flood protection system;

- Limit the areal extent of the excavations to areas just outside the proposed clean-up areas in an effort to minimize excavation, stockpiling, and backfilling of relatively clean on-site soils;
- Limit groundwater inflow into the excavation to expedite excavation efforts, limit handling of wet soils, and minimize treatment of potentially contaminated groundwater;
- Maintain relatively continuous service of the box culvert; and
- Provide for appropriate backfilling and compaction of clean on-site and off-site borrow materials to limit post-construction settlement of surface features overlying and adjacent to excavations.

The required depth of the proposed excavations (35 to 50 feet) and the near proximity of the levee system and 95th Terrace make an open-cut excavation with sloped sides undesirable. In addition, providing a sloped excavation would involve handling significant volumes of relatively clean soil outside the limits of the cleanup areas. Previous excavations at the AICO site utilized a series of sheet pile walls to maintain vertical excavations on the order of 20 feet in depth. The presence of limestone rubble within the former stream channel resulted in over-excavations of the rubble and delays prior to pile driving/placement. Boring information near the proposed cleanup areas indicates that significant limestone rubble is present above the level of the box culvert. The presence of this rubble material and the relatively deeper excavations prevent use of sheet pile.

The excavation scheme selected for the excavation/off-site disposal alternative involves pre-trenching temporary vertical walls using slurry trench techniques. Proposed limits of the excavation and walls are shown in the CMS. Rectangular shaped excavations were selected to facilitate internal bracing installation as described below. Plan areas of Excavation No. 1 and No. 2 are about 60 by 100 feet and 50 by 70 feet, respectively. Excavation of the trenches would be accomplished using appropriate excavation equipment and a slurry to maintain the sidewall stability of the exposed soils. Trench excavations would be extended approximately 4 feet into the shale bedrock to provide a groundwater cutoff and to provide stability at the wall base. Upon reaching the proposed depths, sheet piles would be set into the trench to form a reinforced wall section. A self-hardening cement-bentonite slurry would then be introduced into the excavation to fill the remaining trench voids. The resulting wall section would provide for retention of adjacent soils during excavation and function as a relatively low-permeable barrier to groundwater infiltration.

Excavation of soils within each rectangular area would occur in approximately four increments to allow for installation of internal bracing (wales and struts) at about three levels. Tiebacks as opposed to internal bracing were also considered as a lateral support method. Due to the lack of geotechnical soil data at this time and the potential negative impact on the levee system, tiebacks were not included for this alternative. Excavated soils above the level of the box culvert that are identified as uncontaminated would be stockpiled on-site for use as backfill. Soils below the top of the box culvert that are characterized as contaminated would be loaded into trucks and transported to an off-site landfill. Upon reaching the base of the existing box culvert, an approximate 8-foot deep excavation to shale bedrock is proposed immediately adjacent to one side of the existing culvert. After removal of all soils, the excavation would be backfilled with structural fill up to the base of the existing culvert. A new parallel section of box culvert could then be installed along the length of the excavations. The new culvert would then be connected to the existing box at the limits of each excavation so that flow could be diverted. This method

would allow nearly continuous service of the box culvert. The old culvert could then be removed from the excavation allowing for the excavation beneath the existing culvert to be completed to shale bedrock.

Although the perimeter wall section functions as a relatively low permeable barrier to groundwater infiltration, it is anticipated that some dewatering of the excavation would be required prior to backfilling. It is expected that dewatering could be accomplished using trenches and sumps. Groundwater inflow is estimated to be on the order of 2000 to 5000 gallons per day in each excavation. Collected groundwater would require on-site treatment prior to release to the sanitary sewer system at the KCP.

Backfilling of both excavations would be made using structural backfill. Available materials would consist of clean stockpiled soils and imported borrow soils. Each level of internal bracing would be removed as the backfill operation reaches that position. Upon reaching final grades, the sheet pile sections would be removed from the wall section. Final site grading would include placement of topsoil, seeding, and repaving of the 95th Terrace.

Preliminary estimates of clean and contaminated soil volumes (in-situ) and tons are summarized below.

Excavation Area	Clean Soil		Contaminated Soil	
	In-Situ Volume (Cu. Yd.)	Tonnage (Tons)	In-Situ Volume (Cu. Yd.)	Tonnage (Tons)
Excavation No. 1	8,067	13,069	3,618	5,861
Excavation No. 2	2,333	3,780	1,887	3,058

Total in-situ volume for Excavations No. 1 and No. 2 is estimated to be approximately 15,900 cu. yd. Assuming a 10 percent shrink factor on the clean excavated soil volume, approximately 9,455 cu. yd. of backfill are available from on-site soils. An additional 6,455 cu. yd. (in-situ) or 10,450 tons of imported soils will be required to achieve final grades.

Contaminated soil would be loaded on trucks and transported to a toxic substances control act permitted landfill for disposal. IC's like those described for Alternative 2 would still be required since contaminated soil would remain below the levee and Bannister Road.

DESCRIPTION OF CORRECTIVE MEASURES ALTERNATIVES FOR INDIAN CREEK SEDIMENTS NEAR THE 002 OUTFALL

This section presents the description of alternatives evaluated to address PCB containing sediment in Indian Creek. PCBs were detected in a relatively small area of Indian Creek near the 002 Outfall during the RFI and subsequent sampling events. However, a pre-design investigation would be required to identify the extent of sediments in Indian Creek that contain PCBs from the 002 Outfall above the identified clean-up goals. The alternatives presented below were developed to address risks identified in the risk assessment and to be protective of human health and the environment. Alternatives are not developed for surface water in Indian Creek since PCBs have not been detected in Indian Creek above the health-based cleanup goals.

Alternative 1 – No Action

No action presents a baseline of performance against which to evaluate other corrective measures alternatives. No further actions would be taken to address residual PCBs entering the box culvert and Indian Creek. This assumes no IC's, remediation, or monitoring would be done to address risks associated with PCBs in sediments in Indian Creek near the 002 Outfall.

Alternative 2 – Institutional Controls, Engineering Controls, and Monitoring

This alternative would utilize institutional and engineering controls and monitoring to meet the Corrective Action Objectives. These controls would be designed to be protective of receptors for which potential unacceptable health risks were identified in the risk assessment and the Addendum to the risk assessment. These potential receptors included construction workers working in Indian Creek near the 002 Outfall and adult and child recreational users of Indian Creek. Numerous corrective actions have been completed previously to address PCBs in the 002 Outfall. These corrective actions are summarized below.

- Insituform® lining of storm sewer laterals feeding into the 002 stormwater system box culvert.
- Lining of manholes along the 002 storm sewer.
- Power washing and coating an oil stained area inside the box culvert.
- Sealing of seeps at culvert joints by chemical grouting.
- Re-routing roof drains in the main plant area to avoid areas with PCB containing soil. This activity was designed to minimize the infiltration of PCB contaminated soil not associated with the 95th Terrace Site into the storm sewer and into Indian Creek.
- Removal of PCB-containing roof sands from the roof of Department 26 (D/26).
- Removal of PCB containing mastic from structural steel on the roof of D/26. This mastic flaked off and mixed with roof sands that were released to roof drains during rain events. Removal of this mastic and proper disposal eliminated this material as a potential source of PCBs in the 002 effluent.

These corrective actions have successfully reduced concentrations of PCBs in both the 002 Outfall effluent, and Indian Creek sediments and fish. The additional engineering and IC's which would be applied to further minimize exposure to PCBs in the 002 Outfall in Indian Creek include the following:

- Semi-annual inspection of the box culvert of the 002 storm sewer.
- Sediment removal from the box culvert to be conducted when sediment accumulation at the sluice gate is greater than one inch thick.
- Minimizing fishing, swimming, and wading in Indian Creek by inspecting and maintaining the warning signs that were posted on June 24, 2004, in the area of Indian Creek where PCBs have been detected in sediment and/or fish.

- Inspection and maintenance of the protective cage installed over the 002 Outfall and raceway on August 2, 2004, to restrict access to impacted surface water and sediment in the culvert, outfall, and raceway.

This alternative would also include long-term monitoring of the 002 Outfall and Indian Creek sediment, surface water, and fish. A description of the sampling program is presented below:

- Semi-monthly sampling of stormwater in the 002 Outfall at the flap gate. EPA SW846 Method 8082 has been and will continue to be used for the semi-monthly analyses.
- Quarterly sediment sampling in Indian Creek. This sediment sampling approach will include sampling sediments in Indian Creek in the same approximate locations for each sampling event so that a trend can be followed over time. These proposed locations are described below.
    - Site HOB (Holmes Bridge) is located at the intersection of Holmes Road and Indian Creek on the downstream side of the bridge. This location serves as the upstream background sampling site. Three grab samples will be combined from this location as a single sample.
    - Site 002 is located near the point at which the Outfall 002 Raceway enters Indian Creek. Three grab samples will be collected from the following locations: 1) immediately downstream of the 002 Raceway, 2) immediately upstream of the raceway (to account for the effects of an eddy near the raceway), and 3) cross channel from the raceway within five to ten feet of the end of the raceway.
- Fish sampling in Indian Creek will be conducted in 2005, 2008, and 2013 to provide data to evaluate the success of this alternative at meeting the corrective action objectives developed for Indian Creek. Fish tissue sampling is likely a better indicator of the magnitude of PCBs in Indian Creek over time. The mean concentration of PCBs in sampled green sunfish has declined from 0.522 mg/kg in 1993 to 0.090 mg/kg in 2002 at the confluence of the 002 Outfall discharge and Indian Creek.
- Semi-annual sampling of surface water in Indian Creek and analysis utilizing EPA Method 1668. The KCP has designated six locations in Indian Creek and the Blue River for monitoring under the MHWMF Part I Permit. These locations are described below and shown on Figure 4.

  Indian Creek Upstream – Site Indian Creek Upstream is located on Indian Creek approximately 50 yards upstream from the point where Outfalls 003 and 004 enter Indian Creek.

  Indian Creek Downstream A – Site Indian Creek Downstream A is located on Indian Creek approximately 60 yards downstream from the point where Outfalls 003 and 004 enter Indian Creek.

  Indian Creek Downstream B – Site Indian Creek Downstream B is located on Indian Creek approximately 125 yards downstream of the point where Outfall 002 enters Indian Creek.

  Indian Creek/Blue River (ICBR) – Site ICBR confluence) is located on Blue River upstream of all KCP discharges approximately 30 yards upstream of the point where Indian Creek flows into Blue River.

Blue River Upstream – Site Blue River Upstream is located on Blue River approximately 60 yards downstream of the point where 95th Terrace Bridge crosses the Blue River, which is downstream of ICBR.

Blue River Downstream – Site Blue River Downstream is located immediately downstream of the Prospect Avenue Bridge, which is downstream of all KCP stormwater discharges (Outfalls 001-004) and downstream of Boone Creek which receives Outfall 001 stormwater discharges.

A Public Involvement Plan will be developed for the 95th Terrace Site and included in the CMI Work Plan to be developed as part of the final remedy. To date, DOE has voluntarily completed numerous public involvement activities related to the 002 Outfall and Indian Creek.

These activities include:

- Presentation to the South Kansas City Chamber of Commerce
- Presentation to the Southern Communities Coalition
- Presentation to the Center Planning and Development Council
- Site visit and information packet for the Blue River Watershed Association
- Discussions with the Kansas City Chamber of Commerce
- Publication of several FOCUS articles related to the 95th Terrace Site
- Active participation in the development of a screening questionnaire for an Indian Creek Usage Survey conducted by DNR

Regularly scheduled inspections (semi-annually), sediment removal from the culvert when required, and timely sealing of any seeps found in the culvert will help to further reduce the mass of PCBs entering Indian Creek from the 002 Outfall.

Alternative 3 – Institutional, Engineering Controls, Monitoring, and 002 Outfall Effluent Treatment

Alternative 3 includes the institutional and engineering controls and monitoring described for Alternative 2. Alternative 3 also includes treatment of the 002 Outfall effluent to reduce the discharge of PCB-containing sediment. Removal of solids from the water is intended to remove PCBs which are sorbed to the sediment, silt, sand, and other solids.

Capture of sediments could potentially be accomplished by installing a Stormceptor® (or similar) sedimentation collection unit in the 002 stormwater system. A Stormceptor® unit is designed specifically for in-line installation in a stormwater culvert. Stormceptor® is a concrete vessel designed to intercept and direct stormwater flow in a pattern to allow solids being transported by the stormwater to settle to the floor of the settling chamber and then discharge the stormwater without re-entrainment of the collected solids. Accumulated sediment is periodically removed by vacuum truck. Solids removed from the unit would require proper off-site disposal. Safeguards are included in the design to accommodate excessively high flows resulting from extreme precipitation events and to prevent scouring of collected sediments.

Because of access constraints at the 002 Outfall discharge location at Indian Creek, the Stormceptor® unit would require installation on KCP property at a location where the stormwater access space is available for a sediment removal truck. Collected sediments would need to be properly disposed based on the properties of the collected sediment.

The 002 Outfall flow would be temporarily re-routed to allow stormwater flow during the installation process. Once the installation is completed, the temporary facilities would be removed and the excavation closed. Existing "off-the-shelf" Stormceptor® units would not be large enough for this storm sewer. A unit could potentially be modified to fit the culvert.

Alternative 4 – Institutional, Engineering Controls, Indian Creek Sediment Removal and Monitoring

This alternative includes the IC's, engineering controls, and monitoring described for Alternatives 2 and 3. In addition, sediments in Indian Creek would be removed that exist above a clean-up goal. This action would further reduce the PCBs in Indian Creek but may not have a significant impact on the level of PCBs in fish tissue in Indian Creek. The sediment remediation portion of the alternative would include the following elements:

- Diversion of Indian Creek during construction
- Diversion of 002 Outfall during construction
- Dewatering the area of Indian Creek to be remediated
- Excavation of contaminated sediments
- Off-site disposal of sediment which is removed
- Site restoration

A detailed description of this alternative is presented below.

Alternative 4 includes all the elements of Alternatives 2 and 3 plus removal of an estimated 22 to 30 cubic yards, in-place, (33 to 45 tons) of PCB impacted sediment around the 002 Outfall. The estimated volume to be removed is based on existing data and the assumption that the PCB containing sediment would accumulate in the pool where the 002 Outfall discharges into Indian Creek. It is also assumed that scouring events would remove sediment from the creek periodically and limit accumulation of a large volume at any given time. A pre-design investigation and development of a sediment clean-up goal would be required to estimate the actual volume of sediment to be removed.

A preliminary scope of work summary for the sediment removal from Indian Creek is presented below:

- Prepare Draft and Final Work Plan: Document will describe all phases of the project including permitting, health, and safety.
- Permitting:
    - US Army Corps of Engineers - Kansas City District (Corps): A description of the activities planned and locations of the activities would need to be provided to the Corps' Regulatory Project Manager for determination of Section 404 applicability, and a

wetlands survey should be performed. This survey along with general construction information (e.g., Haul Road route and site photographs) should be presented to the Corps for information only, prior to construction. The Corps would then issue a "No Permit Required" or a “Permit Required” letter for the record. Additionally, issuance of the DNR permit discussed below may depend on results of the wetlands survey.

- DNR: The DNR requires a Dredging Permit (MO-G690000) prior to excavation activities. There is a $150 fee, and the permit will be processed within 60 days. Note: Other permit requirements (e.g., due to wetlands and Section 404 consideration discussed above) may result as the DNR processes the MO-G690000 application.

- Mobilization/Install Haul Road: Mobilize to install approximately 1900 feet of haul road using the Lydia Avenue access route. This route parallels Bannister Road, running between Bannister and Indian Creek. Some trees would need to be removed. Erosion controls will also be required.

- Construct Temporary Dam for Box Culvert Flow: Cost estimate assumes a four foot high by eight foot wide temporary dam constructed with sand bags and plastic sheeting within the culvert. Two (redundancy) 600 gpm sump pumps with 5-inch hose would divert outfall flow to a point downstream. Temporary dam materials would be disposed as impacted material following project completion.

- Construct Isolation Dam: A dam would be required to isolate the proposed excavation area from Indian Creek. Interlocking sheet piling would be driven to a depth of approximately 10 feet around the outside edge of the excavation area, intersecting and overlapping the bank both upstream and downstream. The dam would be a semi-circle extending approximately one-quarter of the way into the stream channel.

- Treat Water: Dewatering would follow isolation dam completion. Assume 10,000 gallons pumped from excavation during the project. A 20,000-gallon frac tank would be used as a storage/settling tank. Water would be pumped from the excavation into the tank using a sump pump, which remains in place. Polymer would be added as a coagulant aid. When a sufficient volume is available, settled water would be filtered and discharged meeting current discharge criteria.

- Water Treatment Sludge: At project completion, tank bottoms (sludge) would be pumped to drums with absorbent material and transported for disposal along with excavated materials. Filters would also be disposed in these drums.

- Excavation: The excavation areal extent was assumed at 300 ft^2 and removal of sediment to a depth of 2 feet. This would involve removal of an estimated 45 tons of impacted sediment.

  This estimate is based on sediment sampling results from the RFI and the data presented in the Interim Measures Report. A pre-design report would be required to identify the extent of PCBs in Indian Creek downgradient of the 002 Outfall which would be removed.

Use fly ash as necessary to stabilize sediments for loading and transport. A 1.5 bulking factor was used to account for additional fly ash weight (i.e., 10 tons of sediment would be transported as 15 tons of material after mixing). Note: a pre-design investigation was included in the cost estimate to more accurately delineate the areal extent of impact prior to excavation.

- Confirmation Sampling/Stabilization: Collect ten sediment samples for confirmation sampling.
- Disposal: It was assumed that disposal would be in the Emelle, AL landfill.
- Site Restoration.

Evaluation of Alternatives

Each of the major final remedy options are evalated against a specific set of evaluation criteria. The evaluation criteria reflect the major technical components of remedies including clean up of releases, source control and management of wastes that are generated by the remediation activities.

Primary Criteria

The primary criteria presented below are those that require documentation be presented to show the potential corrective measure complies with the criteria.

- **Protect Human Health and the Environment**

  Corrective action remedies must be protective of human health and the environment. Remedies may include those measures that are needed to be protective, but not directly related to media cleanup, source control, or management of wastes. An example would be a requirement for the construction of barriers to prevent contact with the waste management units.

- **Attain media clean-up standards set by the implementing agency**

  Remedies will be required to attain media clean-up standards set by the implementing agency, which may be derived from existing state or federal regulations or other standards. In some cases, certain technical aspects of the remedy, such as the practical capabilities of remedial technologies, may influence, to some degree, the media clean-up standards that are established.

- **Control the sources of releases**

  A critical objective of any remedy must be to stop further environmental degradation by controlling or eliminating further releases that may pose a threat to human health and the environment. Unless source control measures are taken, efforts to clean up releases may be ineffective or, at best, will essentially involve a perpetual cleanup.

- **Comply with any applicable standards for management of wastes**

  All remediation activities must comply with state or federal regulations.

Secondary Criteria

Other Factors

There are five general factors that will be considered as appropriate by DNR in approving a final remedy that meets the four standards listed above. These factors represent a combination of technical measures and management controls for addressing the environmental problems at the facility. The five general secondary decision factors are discussed below.

- **Long-term reliability and effectiveness:** Demonstrated and expected reliability is a way of assessing the risk and effect of failure. It must be considered whether the technology or a combination of technologies have been used effectively under analogous site conditions, whether failure of any one technology in the alternative would have an immediate impact on receptors, and whether the alternative would have the flexibility to deal with unforeseen changes at the site.
- **Reduction in the toxicity, mobility, or volume of wastes:** As a general goal, remedies will be preferred that employ techniques, such as treatment technologies, that are capable of eliminating or substantially reducing the inherent potential for the wastes in SWMUs to cause further environmental releases or other risks to human health.
- **Short-term effectiveness:** Short-term effectiveness may be particularly relevant when remedial activities will be conducted in densely populated areas, or where waste characteristics are such that risks to workers or to the environment are high and special protective measures are needed. Possible factors to consider include fire, explosions, exposure to hazardous substances and potential threats associated with treatment, excavation, transportation, and redisposal of wastes.
- **Implementability:** Implementability will often be a determining variable in shaping remedies. Some technologies will require state or local approvals prior to construction, which may increase the time necessary to implement the final remedy. Some technologies may be completely eliminated due to restrictions applicable to the site.
- **Cost:** The relative cost of a final remedy may be an appropriate consideration, especially in those situations where several different technical alternatives to remediation will offer equivalent protection of human health and the environment.

Soil

Each alternative for soil was evaluated against the following four general standards and five secondary final remedy decision factors.

Alternative 1 – No Action

Alternative 2 Institutional and Engineering Controls, Monitoring

Alternative 3 – Excavation and Off-site Disposal

Primary Criteria

1. *Overall Protection of Human Health and the Environment.* Alternative 1 would not minimize exposure to contaminated soil or infiltration of contaminated soil into the 002

storm sewer box culvert and no action would be taken to protect workers. Alternative 2 provides IC's, engineering controls, and monitoring to meet corrective action objectives for the site. Under Alternative 3, deeply buried contaminated soil would be brought to the surface where there is a potential for release through wind or rainfall. During excavation a release of contaminated soil would occur if the creek should flood. Unwanted erosion of the excavation would also occur. Backfilling the excavation with clean soil eliminates the possibility of exposure during future construction impacting deep soils.

2. *Attain Media Clean up Standards*

   Alternative 1 would not attain media clean-up standards since no remediation would take place. Alternative 2 provides for IC's which would minimize exposure to soil containing PCBs above the health-based clean-up goals. Alternative 3 would remove soil containing PCBs above the health-based clean-up goals of 6 mg/kg. Some soil containing PCBs would remain under the flood control levee and Bannister Road.

3. *Controlling the Source of the Release*. The source of the release of PCBs to the soil was from spills that occurred in the late 1960s and early 1970s. No additional sources are present**.** The soil contamination present at the 95th Terrace Site is not mobile and is not a source for the further spread of contamination.

4. *Comply with waste management standards.* No waste will be generated with Alternatives 1 or 2. Under Alternative 3 contaminated soil removed from the site will be disposed in a permitted PCB landfill.

<u>Secondary Criteria</u>

1. *Long-Term Reliability and Effectiveness*. Alternative 1 is not reliable or effective in meeting corrective action objectives or protecting human health in the long term. Alternative 2 would be reliable and effective in the long term in minimizing exposure to PCB contaminated soil and minimizing infiltration of PCB contaminated soil from the 95th Terrace Site into the 002 storm sewer. Any work on the 002 storm water system would utilize appropriate health and safety controls. Alternative 3 would be reliable and effective in the long term.

2. *Reduction of Toxicity, Mobility, or Volume of Wastes*. Alternative 1 does not reduce the toxicity, mobility, or volume except what would occur through natural attenuation. Alternative 2 does not reduce toxicity or volume of PCBs at the site. Long-term maintenance of the 002 stormwater system would reduce potential mobility of PCB soil into the system. Alternative 3 would not reduce the volume or toxicity of soil because it would simply be moved from one location to another. Also, all soil contamination would not be removed under Alternative 3.

3. *Short-Term Effectiveness*. Alternative 1 may be effective in the short term since there will be no disturbances of contaminated soil. No excavation projects are planned and

no short-term risks are present with Alternative 2. Alternative 3 presents some short-term risks in that excavaton of PCB laden soil could migrate to other environments through wind dispersion or storm run-off.

4. *Implementability*. Alternatives 1 and 2 are readily implementable. Alternative 3 is implementable but involves complex excavation procedures. It would require undermining a major flood control levee and closing Bannister Road, a major east west transportation artery, during the removal action.

5. *Cost*.

There is no cost with Alternative 1. The estimated cost of Alternative 2 in the first year is $224,000 with subsequent annual costs of $71,000, which gives a total 30 year cost of $1,531,538 using a 3.5 % discount rate. The 3.5 percent discount rate is taken from Appendix C of Circular No. A-94, the Office of Management and Budget guidelines for federal programs. The estimated cost of Alternative 3 is $14.4 million dollars.

Sediment

Alternative 1: No Action

Alternative 2: Institutional /Engineering Controls Monitoring

Alternative 3: Institutional/ Engineering Controls, Source reduction and 002 Outfall Treatment

Alternative 4: Institutional/Engineering Controls, Indian Creek Sediment Remediation and Monitoring

Remedy options

1. Protection of Human Health and the Environment.

Alternative 1 is not protective of human health. The risk assessment identified several potential receptors and human health risks that would not be addressed under this alternative. Under Alternative 2 the installation of the cage structure at the 002 Outfall eliminates potential exposure to the raceway, culvert, and the 002 Outfall effluent itself. This structure eliminates recreational exposure to 002 effluent and sediment within the culvert significantly lowering human health risks at the site. Alternative 3 is similar to Alternative 2 in that controls would be put in place. Sediment removal would be inefficient but would assist in further reducing PCBs at Outfall 002. The addition of sediment removal using the Stormceptor technology would likely not add significant protection of human health that would be achieved with Alternative 2. Alternative 4 would be similar to previous alternatives with the exception of Indian Creek sediment remediation. Recent sediment sampling results show that clean-up goals for recreational exposure (wading) and construction workers in Indian Creek have already been met. It is likely that storm events may flush much of the sediment from this area on a fairly regular basis. Conducting sediment removal would have a minor impact on the mass of PCBs in Indian Creek over time.

2. *Attainment of Media Clean-up Standards.*

Alternative 1 would likely not attain media clean-up standards since no additional IC's, engineering controls, or remediation would take place. Alternative 2 has already attained media clean-up standards based on recent sample data. Implementation of Alternative 3 includes the removal of sediment but is not likely to achieve a significant reduction in small particles which are believed to be carrying PCBs into the 002 Outfall. Indian Creek sediments will be removed as a part of Alternative 4; however, sediment clean-up goals for recreational users and construction workers in Indian Creek have been met through previous actions.

3. *Control of the Source of Release.*

Alternative 1 assumes no additional steps would be taken to address PCBs entering 002 Outfall. The objective of Alternative 2 is to minimize, to the extent practicable, PCBs entering 002 Outfall.

The source of the release of PCBs to the environment was from spills that occurred in the late 1960s and early 1970s. No additional sources are present. The soil contamination present at 95th Terrace is not mobile except when entrained in groundwater and is not a source of further contamination. The objective of Alternatives 2 and 3 is to minimize, to the extent practicable, PCBs entering the 002 Outfall. Past remediation efforts in the 002 storm sewer system have significantly reduced PCB concentrations and reduced the mass of PCBs in the 002 Outfall discharge at a cost of approximately $15 million. PCBs currently are present in the 002 Outfall effluent at approximately 0.5µg/L in samples collected for the Missouri SOP. The additional source control measures will likely reduce the concentration further over time.

Alternative 4 adds a sediment removal action in Indian Creek and does remove a potential source of PCBs to fish in Indian Creek near the outfall. This alternative includes significant source reduction efforts as described in Section 5.2.

4. *Comply with waste Management Standards.*

No waste is generated under Alternative 1. For Alternative 2 waste may be generated by implementing IC's, and for Alternatives 3 and 4 waste will be generated from sediment removal including sediment removal from the box culvert. In each case, waste will be disposed according to applicable regulations and for Alternative 4 Indian Creek sediment is disposed of according to applicable regulations.

Secondary Criteria

1. *Long-Term Reliability and Effectiveness.*

Alternative 1 is not effective in the long term at meeting the corrective action objectives. Institutional and Engineering controls under Alternative 2 will be effective but must be maintained over the long term to be effective. For Alternative 3 implementation of the Stormceptor system will not be effective in removing all sediments according to the information provided by the manufacturer. Alternative 4 would be effective in the short term but would only be marginally more effective that Alternative 2 at eliminating risks

at the site. Surface water sampling upstream of the 002 Outfall indicates other sources of PCBs in Indian Creek, which can negate some of the value of the sediment remediation. Sediment removal would have to be repeated periodically.

2. *Reduction of Toxicity, Mobility, or Volume of Wastes*.

No reduction in toxicity, mobility, or volume of contaminants would occur with Alternative 1. Alternative 2 includes significant source control measures including removal of sediments within the 002 system. For Alternative 3, previous engineering controls have already removed much of the PCB containing sediment that could be removed by Stormceptor. Alternative 4 would involve the removal of an estimated 45 tons of impacted sediment from Indian Creek. This removal would reduce the mobility of PCBs in Indian Creek once they are removed.

3. *Short-Term Effectiveness*.

No additional short-term effectiveness is provided by Alternative 1. No short-term risks are associated with Alternative 2. Programs are in place to assure that any disturbance of PCB containing material will be completed safely. Alternative 3 does pose short-term risks during excavation to intercept stormwater for the installation of the Stormceptor. Alternative 4 poses more short term risks than other alternatives as PCBs could be released to the environment during excavation activities.

4. *Implementability.*

Alternatives 1 and 2 are readily implementable whereas the sediment removal process using the Stormceptor technology (Alternative 3) would have some implementability concerns and significant design costs since it would take a modified Stormceptor unit to fit in the very large 002 culvert. Alternative 4 would require significantly more planning than other alternatives due to the diversion of 002 Outfall/Indian Creek and for provisions for dealing with storm events during the project.

5. Cost.

No cost is associated with Alternative 1. The estimated first year cost of Alternative 2 is $224,000, with a discounted 30-year cost of $1,531,538. Please note IC's, engineering controls, and monitoring associated with Alternative 2 for sediment and Alternative 2 for soil consist of the same activities, thus this cost is the same as shown previously for soil Alternative 2. The estimated cost for Alternative 3 would be $2.5 million initially and $6.5 million over 30 years. The estimated initial cost for Alternative 4 would be $396,000 and $1.7 million over 30 years.

EVALUATION OF THE PROPOSED FINAL REMEDY AND ALTERNATIVES

After evaluating the corrective measure alternatives, DOE is proposing Soil Alternative 2 - Institutional and Engineering Controls and Sediment Alternative 2 – IC's, Engineering Controls, and Monitoring.

Soil Alternative 2

Soil Alternative 2 is protective of human health and the environment and can meet the corrective action objectives for the 95th Terrace. The justification for this alternative includes the following:

- The PCB-contaminated soil at the 95th Terrace Site is present at depths of 30 to 45 feet below ground surface and is mostly beneath the box culvert built within a long ago abandoned and buried channel (Figure 3) of Indian Creek. The potential for human exposure to the PCB-contaminated soil is very low.
- Evaluations by DOE as a part of the corrective action process indicated that the PCBs present at the 95th Terrace Site are not mobile and have remained in the old abandoned and buried Indian Creek Channel for the 30 years since the spill.
- Routine construction activities on 95th Terrace or Bannister Road would not disturb PCB-contaminated soil or cause exposure to construction workers because of the depth to the contamination.
- Investigations conducted by DOE as a part of the corrective action process indicated that residual PCBs being detected in the 002 Outfall are coming from storm sewer laterals upstream from an area unrelated to the 95th Terrace Site. This specific discharge is being addressed by DNR as part of the Missouri State Operating Permit for the 002 Outfall.
- The sources of PCBs to the deep soils at the 95th Terrace Site have been eliminated. The PCB heat transfer piping and oil were replaced in 1986.
- The IC's recommended as a part of Alternative 2 would address future construction activities to ensure the PCB contaminated soils are not disturbed without appropriate environmental and safety controls.
- Regular inspection and maintenance of the box culvert within the permitted 002 stormwater system will be conducted to assure integrity is maintained. Any cracks and seeps identified in the future in the 002 storm sewer system will be remedied according to a predetermined schedule. If the culvert requires a major repair or replacement in the future, any contaminated soil disturbed during construction would be handled according to the applicable state and federal environmental safety and health regulations.

Sediment Alternative 2

Much of this alternative has already been voluntarily implemented and is believed to be responsible for the significantly reduced levels of PCBs in the 002 Outfall effluent, Indian Creek sediments, and fish. The justification for this alternative includes the following:

- Installation of an access restriction (cage structure) over the 002 Outfall and raceway has effectively eliminated uncontrolled exposure to sediments and water and will significantly lower risks to human health at the site. Specifically, installation of a cage eliminates recreational exposure to the surface water and sediment in the raceway and culvert.

- The level of PCBs in fish in Indian Creek have declined to the point where they are below the level where an excess cancer risk greater than the $1x10^{-5}$ risk is not present based on the most recent round of fish sampling in 2002.
- Institutional and engineering controls will be protective of potential future construction workers and recreational users in Indian Creek. This alternative also addresses the potential risk associated with consumption of fish caught from Indian Creek. Warning signs posted along the creek near the storm water outfalls should reduce the incidence of fishing, wading, and swimming.
- As a part of the proposed final remedy, the KCP will continue investigations and actions to reduce PCBs in the 002 Outfall effluent. Removal of sediment from the box culvert and sealing of seeps that may arise as described for this alternative will help to further reduce the mass of PCBs entering Indian Creek from the 002 Outfall. Sediment removal from within the box culvert will be scheduled when the semi-annual inspection identifies sediment in the sluice gate greater than one inch thick. The comprehensive monitoring program included in the recommended alternative will provide data to assess the successful implementation of this alternative.
- The Hazard Index (HI) will continue to be calculated to assess noncarcinogenic health effects due to multiple-pathway (ingestion, dermal contact, and inhalation) chronic exposure from all chemicals (Hazard Quotients for each route of exposure and each chemical) at a site. If the sum HI of all Hazard Quotients is one or less, then there are no unacceptable noncarcinogenic health effects. Three sediment samples will be taken quarterly from Indian Creek near the 002 Outfall, and averaged for the HI calculation. The KCP will notify DNR anytime unexpectedly high concentrations of PCBs are found in Indian Creek sediment. Additional sampling of Indian Creek sediment downstream of Outfall 002 will occur if the HI for recreational receptors near Outfall 002 were to exceed a value of 1 for two consecutive future sampling events. If the HI were to exceed a value of one for four consecutive future sampling events, this would trigger additional investigation and evaluation of potential causes for the upward trend of PCBs in Indian Creek sediments and the possible need to implement other corrective measure alternatives for contaminated sediment in Indian Creek and to further evaluate the human health risk assessment.

SUMMARY

The proposed final remedy for soil contamination at the DOE 95th Terrace Site is Alternative 2: Institutional and Engineering Controls, Monitoring. The proposed final remedy for sediment contamination is Alternative 2 – IC's, Engineering Controls, and Monitoring.

The soil contamination poses minimal threat to human health and the environment. Under the proposed final remedy, controls would limit exposure to the soil contamination. The proposed final remedy is cost effective and can be implemented immediately. It is effective in the short term and long term and is a practical remedy for current facility conditions. DOE would continue to investigate innovative treatment technologies for the contaminated soil.

The sediment contamination poses minimal threat to human health and the environment. Under the proposed final remedy, semi-annual inspection of the box culvert and sediment removal will continue. Cage installation restricts access to sediment in the raceway and signs minimize fishing, wading, and swimming near Outfall 002. Quarterly sediment samples will be taken in Indian Creek. Fish sampling will be conducted in 2005, 2008, and 2013 to evaluate the success of this alternative over time. This is an effective and practical remedy for current facility conditions.

PUBLIC PARTICIPATION

DNR is seeking comment from the public on the proposed final remedy and the corrective measure alternatives presented in this SB and described in greater detail in the corrective action administrative record for the facility. DNR is also interested in comments on any corrective measure alternatives that are not presented here or were not evaluated in the 2004 CMS. DNR has set a public comment period of 45 days from July 22, 2006 to September 5, 2006.

A public hearing will be scheduled if requested in writing along with the issues to be raised in the hearing. The public may submit written comments, questions, or request for a public hearing concerning the SB to the following address:

Mr. Don Dicks
Missouri Department of Natural Resources
Hazardous Waste Program
1738 Elm Street
P.O. Box 176
Jefferson City, MO 65102-0176
Telephone: (573) 751-3553
FAX: (573) 526-5268

Any comments received from the public during the public comment period will be summarized, and the department responses will be provided to individuals submitting the comments. The responses to comments will be prepared at the conclusion of the public comment period and incorporated into the administrative record for the DOE facility.

The administrative record, including the RCRA Facility Investigation Report for the 95th Terrace Site dated September 2000, and the CMS for the 95th Terrace Site dated July 26, 2004, is available for review at the following locations.

1. Mid-Continent Library, Blue Ridge Branch, 9253 Blue Ridge Boulevard.
   Kansas City, Missouri, Telephone: (816) 761-3382 Hours: Monday through Thursday, 9 a.m. through 9 p.m.; Friday, 9 a.m. through 6 p.m.; Saturday, 9 a.m. through 5 p.m.

2. U.S. Environmental Protection Agency, Region VII, Library, Kansas City, Kansas, Telephone: (913) 551-7241 Hours: Monday through Friday, 8 a.m. through 5 p.m.

3. By appointment
Missouri Department of Natural Resources
Hazardous Waste Program
1738 East Elm Street (lower level)
Jefferson City, Missouri
Phone: (573) 522-3345

Figure 1

Figure 2

Figure 3